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Solving the Work Zone Puzzle

*coordinated industry approach can
accidents and save lives in roadway work
by Bradley Sant*

Most motorists realize roadway construction work zones are dangerous places. Workers who labor eight hours a day adjacent to speeding traffic understand more acutely the hazardous nature of these construction sites. Nevertheless, motorists and workers continue to die at alarming rates in work zones. The most recent federal data show that 868 people died and 38,000 were injured in 1999. Those numbers demonstrate that nearly three people are killed every day; approximately 120 of the fatalities are workers who die at a rate of one every three days.

The enactment of the Transportation Equity Act for the 21st Century (TEA-21) in 1998 created record-level funding for transportation improvement projects, with well over \$200 billion in scheduled improvements over the next several years. As a result, the American Road & Transportation Builders Association (ARTBA) predicted a 66 percent increase in roadway work zones. The challenging aspect of this escalation in construction is that most of it will be done on existing roadways that will remain open to motorists during the construction phase. This "construction under use" situation creates hazards and safety conflicts for roadway contractors, workers, and motorists.

Failure to Communicate

When people speak of safety in the roadway construction industry, the word "safety" can mean many different things, depending upon their perspective and experience. To date, principles of traffic safety and worker safety have often been treated separately--where traffic safety advocates and worker safety advocates have failed to "talk across the barricades" and understand how the activities of one group affect the safety and health of the other. This failure to communicate has resulted in unintended consequences where the actions of one group to promote safety for its constituency have sometimes created increased hazards for the constituents of the other.

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One reason for the competing safety interests lies in the fact that more parties are involved in roadway construction than other sectors of the industry. Unlike general construction, the user of the facility is not the owner--it is the motorist. As construction disrupts traffic, motorists often put great pressure on the government (the owner) to conduct work with minimal disruption. In turn, the government passes this mandate to the

contractor. As a result, the contractor is required to conduct work in an atmosphere that is not always conducive to the safety of the workers.

Increasingly, government owners are placing greater restrictions on contractors regarding the timing and organization of roadway construction. Because the roads are in use, construction specifications and even traffic ordinances are being drafted and implemented to: 1) encourage work to be done more quickly; 2) minimize the size of the work zone; 3) work during evening and night-time hours; and 4) maintain normal traffic speeds for passing motorists.

While these requirements are helpful to minimize motorist inconvenience and improve traffic safety conditions, they directly affect worker safety. Smaller work zones coupled with expedited schedules create hazardous conditions, leading to the primary worker hazard within the work zone: "struck-by" incidents. Data from the Census of Fatal Occupational Injuries 1992-98 show that 19 percent of worker deaths in the heavy and highway construction industry were caused when construction vehicles and equipment struck pedestrian workers. The only greater hazard is that posed by motorists who intrude past the barricades and strike workers, accounting for 23 percent of the fatalities. Recent data trends indicate the primary cause is shifting, with more workers being killed by construction vehicles and equipment than motorists.

Large vehicles operating in confined areas, adjacent to pedestrian workers, create situations that place workers at great risk for injuries and fatalities. Night work increases risks to workers because of impaired vision and fatigue, not only from motorists but also from the workers themselves. Moreover, workers are much less likely to be struck by a vehicle intruding the barricades when traffic moves by at 30 miles per hour (mph) as opposed to 65 mph.

These hazards are not created nor easily controlled by the contractor. The owner (e.g., the state department of transportation) and motorists impose many of these hazardous conditions upon the worker and contractor. As a result, the contractor alone is not always in the best position to implement changes to improve work zone safety.

Opportunities for Improvement

There are several opportunities for the industry to improve work zone safety. Because "struck-by" incidents hold a commanding lead over other causes of heavy and highway worker deaths, greater emphasis is being placed on worker visibility. The first solution to this hazard is increased use of "high visibility clothing" during both day- and night-time operations.

High visibility clothing refers to reflective garments that workers should wear whenever their workplace contains hazards related to low visibility or proximity to moving vehicles or equipment. In 1999, the International Safety Equipment Association and the American National

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Standards Institute developed a new industry standard to provide national uniformity for such clothing--ANSI/ISEA 107-1999. The standard establishes three classes of high-visibility safety apparel. Class 1, 2, or 3 garments are selected for each level of visibility, depending on traffic speed, visual conditions, and the proximity of the worker to the hazard. Garments that meet the ANSI/ISEA 107-1999 standard can be worn any time--day or night--to provide users with a high level of visibility through the use of retro-reflective materials and fluorescent colors.

The following table can help in determining which class of material is most appropriate:

	Class 1	Class 2	Class 3
Speed of Traffic	25 mph	25-50 mph	Above 50 mph
Volume of Activity	Low	Medium	High
Minimum Area of Background/ Retroreflective Material	217 in ² /155 in ²	775 in ² /201 in ²	1,240 in ² /310 in ²

Another method for better protecting roadway workers--and keeping motorists out of the work area--is more frequent use of barriers. While cones, barrels, and tubular devices may be useful in delineating the line between traffic space and worker space, they provide virtually no protection against intruding vehicles that cross the barricades and endanger workers' lives. NCHRP-350 approved barriers (such as concrete "Jersey-type" barricades) provide positive protection by slowing or preventing a vehicle from leaving traffic lanes and striking a worker.

The use of impact-resistant barriers often requires more planning, cost, and permission from the roadway owner in some cases, before they can be used. The greater protection they provide, however, often makes their cost justifiable.

A third method contractors should employ is implementation of an "internal traffic control plan." Traffic control plans are standard practice in roadway construction, designed to provide the safest and most efficient means for traffic to pass through work zones. The same considerations used in external traffic control should be applied when determining where and how construction equipment, vehicles, and workers on foot interact within the work area.

The size and configuration of roadway construction vehicles and equipment often make it difficult for operators to see nearby workers on foot. It is essential for operators to know where to expect workers, as it is likewise critical for workers to be familiar with traffic

patterns of equipment. Among other things, an internal traffic control plan should include detailed communication protocols between workers and operators, designated areas for worker activity--away from equipment when possible, and pre-determined traffic paths for supply vehicles that regularly enter and exit the work area.

Safety Professionals' Role

Finally, better coordination must take place at all levels-national, state and local-to increase the safety dialogue between the departments of transportation, contractors, labor, the Occupational Safety and Health Administration (and related state programs), insurance, and safety professionals. These groups must meet regularly to discuss, understand, and align their safety agendas. Until and unless this is done, well-intended individuals and organizations will continue to inadvertently work against each other in promoting uncoordinated safety programs.

The industry is responding positively to roadway work zone safety needs. ARTBA has worked on work zone safety matters for many years. In 1998, ARTBA signed an exclusive agreement with the National Safety Council to work together to promote work zone safety. Under this alliance, ARTBA and NSC have developed training programs, model state partnerships, national conferences, and even an awards program--all directly focused on roadway work zone safety.

ARTBA, the Federal Highway Administration, and the Texas Transportation Institute teamed in 1997 to create the National Work Zone Safety Information Clearinghouse. The clearinghouse contains the world's largest "cyber-library" on work zone safety information, provided free to the user. It can be found at wzsafety.tamu.edu. Also, a number of industry groups have begun working with ISEA to promote greater use of PPE in roadway construction.

There is much that is being done to promote work zone safety. We must continue to find new and innovative ways to promote work zone safety, however, if we are truly going to curb the high rate of worker and motorist fatalities in roadway work zone incidents. When all affected parties are able to coordinate a unified approach to safety, contractors will be better equipped to implement optimal work practices that effectively protect workers and motorists simultaneously.

Bradley Sant is Vice President for Safety and Education with the American Road & Transportation Builders Association (www.artba.org) in Washington, D.C. He recommends ARTBA's Web site for work zone safety-related information, as well as the sites of the National Work Zone Safety Information Clearinghouse (wzsafety.tamu.edu) and the Federal Highway Administration (safety.fhwa.dot.gov).